

ABSTRACT

Methods and apparatus are provided for reorienting control moment gyros (CMGs) to compensate for CMG failure or change in spacecraft (S/C) mass properties or mission. An improved CMG comprises a drive means for rotating the CMG around an axis not parallel to the CMG gimbal axis. Releasable clamps lock the CMG to the spacecraft except during CMG array reorientation. CMGs arrays are combined with attitude sensors, a command module, memory for storing data and programs, CMG drivers and sensors (preferably for each CMG axis), and a controller coupling these elements. The method comprises determining whether a CMG has failed or the S/C properties or mission changed, identifying the working CMGs of the array, determining a new array reorientation for improved spacecraft control, unlocking, reorienting and relocking the CMGs in the array and updating the S/C control parameters for the new array orientation.